

RENEWABLES SECTOR: WIND FROM HEAVEN

◆ NORTH DAKOTA

Using Wind Turbines to Reduce Electricity Consumption

On June 16, 1997 a group of Benedictine nuns at the Sacred Heart Monastery in Richardton, North Dakota began operation of two wind turbines. The project was started to combat escalating utility bills while simultaneously protecting the environment. The sisters installed two 100 kW turbines as this option was more cost-effective than purchasing one larger turbine. In addition to generating approximately half of the monastery's annual electricity needs, on some days the turbines generate more electricity than the monastery can consume. This excess is returned to the local generation and transmission company. Because the monastery is part of a rural utility system, the utility provider is not required to pay full price for the excess electricity, but only for the avoided transmission costs under North Dakota's current net billing regulations.

The sisters plan to continue using the wind turbines until they have paid for themselves. Eventually, after the turbines age and maintenance costs rise, the sisters hope to replace them with a single, state of the art turbine.



Results:

The wind turbines at the Sacred Heart Monastery have worked very successfully, producing 179,410 kWh in their first year of operation. After some maintenance work (completed by monastery employees) and fine tuning the turbines operated even more efficiently the second year, producing 242,870 kWh.

Of this amount, 162,530 kWh were used by the monastery and 80,340 kWh were returned to the utility. Current prices for rural electricity are 9.18 cents per kWh—meaning the monastery saved \$14,900 by generating their own electricity. In addition, they were paid 1.14 cents per kWh returned to the utility, saving an additional \$900 for a total savings of \$15,800 (or almost half of their utility bill if they did not have the turbines). At this rate, the turbines will have paid for themselves in less than ten years. In addition to the monetary savings, the project also saved 137 metric tons of CO₂ (37 MTCE)*, 1.27 metric tons SO₂ and 0.76 metric tons NO_x.**

| Electricity Generated | Cost Savings | Greenhouse Gas Reductions |
|-----------------------|--------------|---------------------------|
| 242,870 kWh/yr | \$15,800/yr | 37 MTCE*/yr |

Principal Actors:

Sacred Heart Monastery in Richardton, North Dakota

Additional Information:

Sr. Paula Larson, Sacred Heart Monastery, P.O. Box 364, Richardton, ND 58652, phone: (701) 974-2121.

This case study is based on information provided by Sr. Paula Larson, Sacred Heart Monastery and *The Benedictine Witness*, retrieved on 13 September 1999 from <http://www.rc.net/bismarck/shm>.

* Original data have been converted from kWh to Metric Tons of Carbon Equivalent (MTCE) based on the conversion factors 1.244 lbs. CO₂/ kWh (The Cadmus Group, Inc. *Regional Electricity Emission Factors Final Report*, 1998, Exhibit 6). and 0.27 lbs. C/lb. CO₂.

** The following conversion factors were applied to the original data: 11.55 lbs. SO₂ / kWh, 6.93 lbs. NO_x / kWh. Numbers are based on state specific factors from Emissions & Generation Integrated Database (E-GRID), EPA/Acid Rain Program.